



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

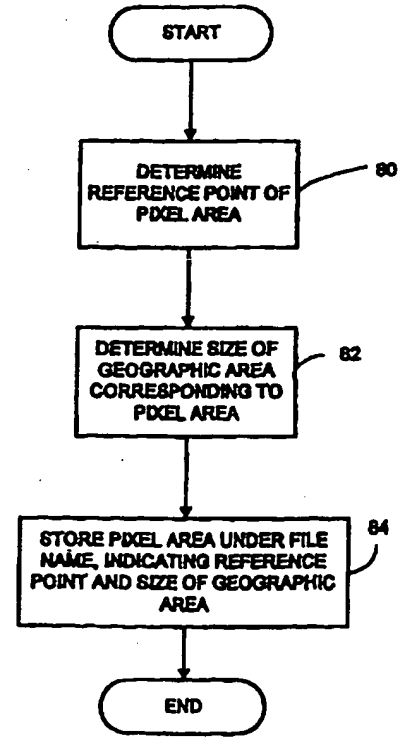
<p>(51) International Patent Classification <sup>6</sup> : <b>G06F 3/14, G09G 1/06</b></p>	<p><b>A1</b></p>	<p>(11) International Publication Number: <b>WO 97/49027</b>                   (43) International Publication Date: 24 December 1997 (24.12.97)</p>
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<p>(21) International Application Number: PCT/US96/10708                  (22) International Filing Date: 20 June 1996 (20.06.96)                  (71) Applicant: AMES RESEARCH LABORATORIES [US/US];                  3895 Belvedere N.W., Salem, OR 97302 (US).                  (72) Inventors: CURTRIGHT, William, Ames; 3895 Belvedere                  N.W., Salem, OR 97302 (US). PARKS, Edwin, E.;                  886 Fairview Avenue S.E. #27, Salem, OR 97302 (US).                  ROETHE, Kevin, J.; 270 W. Ipswich, Gladstone, OR 97027                  (US). BIEKER, Matthew, T.; 2329 S.E. Beavercreek Ln,                  Troutdale, OR 97060 (US).                  (74) Agent: BECKER, Mark, L.; Klarquist, Sparkman, Campbell,                  Leigh &amp; Whinston, One World Trade Center, Suite 1600,                  121 S.W. Salmon Street, Portland, OR 97204 (US).</p>	<p>(81) Designated States: AU, BR, CA, CN, CZ, FI, JP, KP, KR,                  MX, NO, NZ, PL, RU, SD, SG, UA, European patent (AT,                  BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC,                  NL, PT, SE).                    Published  <i>With international search report.</i></p>
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(54) Title: METHOD AND APPARATUS FOR GENERATING DIGITAL MAP IMAGES OF A UNIFORM FORMAT

(57) Abstract

A computer-implemented method of converting printed maps into digitally stored images of a unique format. Bit mapped map images corresponding to a printed map are obtained by scanning or other means. A bit mapped map image is then cropped to select a map image corresponding to a desired geographic area, such as a one degree by one degree area (80). The boundaries of the selected map image are moved to shape the geographic area into a tessellated shape, such as a rectangle. The selected map image is then re-sized to contain a predetermined pixel area (82). The map image, now of a uniform format, is then stored within an identifier of a reference point and size of the geographic area (84) represented by the map image. For example, the identifier (84) may be the name of a computer-readable file containing the map image.





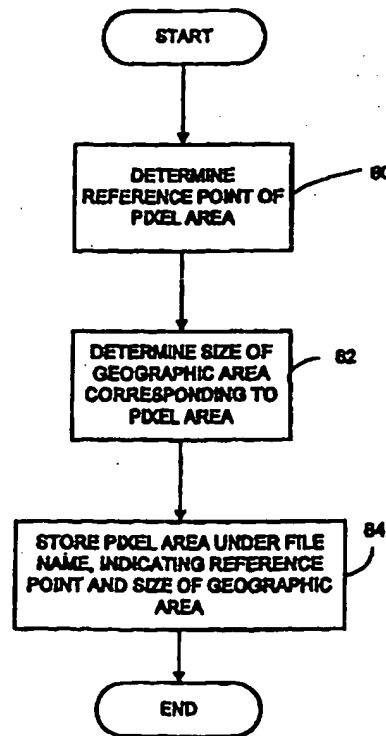
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A computer-implemented method of converting printed maps into digitally stored images of a unique format. Bit mapped map images corresponding to a printed map are obtained by scanning or other means. A bit mapped map image is then cropped to select a map image corresponding to a desired geographic area, such as a one degree by one degree area (80). The boundaries of the selected map image are moved to shape the geographic area into a tessellated shape, such as a rectangle. The selected map image is then re-sized to contain a predetermined pixel area (82). The map image, now of a uniform format, is then stored within an identifier of a reference point and size of the geographic area (84) represented by the map image. For example, the identifier (84) may be the name of a computer-readable file containing the map image.



## METHOD AND APPARATUS FOR GENERATING DIGITAL MAP IMAGES OF A UNIFORM FORMAT

### FIELD OF THE INVENTION

5           This invention relates generally to image processing. More particularly, this invention relates to a method for converting printed maps into digitally stored images of a unique format.

### BACKGROUND OF THE INVENTION

10           Computer systems that can generate and display geographic map images are now commonly available. Typically a computer system that provides map images has stored within its memory system, such as in secondary storage, data corresponding to the map images. The map image data, if stored as bit maps, may be then be directly retrieved for display. Or the map image data may  
15 be stored as information within a database, and the computer system may independently generate a map image from the database information.

          An increasingly popular use of computer-generated map images is for graphical navigation systems, such as "moving map" systems. Pioneer Electronics of Tokyo, Japan, for example has designed a moving map system for  
20 vehicles such as automobiles. A moving map system receives data from the Global Positioning System (GPS) satellites to determine the vehicle's current location. The moving map system uses this data to select geographic data stored in the system, such as on a CD-ROM, and retrieves therefrom a map image of the current location for display. The map image is actually a changing  
25 combination of several images that are generated as the vehicle moves from one geographic location to another, giving the appearance that the map is moving. A cursor on the map image shows the current vehicle location to the vehicle operator and allows him to navigate with the map image.

          A drawback of present computer systems for displaying map images  
30 is the poor quality of the map images they display. In systems that generate map images from data within a database, the detail of the map image is sparse. Only those geographic objects that are recorded within a database field appear on the

We claim:

1. A computer-implemented method of converting a printed map into a digital map image, comprising:
  - converting the printed map into a bit mapped map image
  - 5 corresponding to the printed map;
  - cropping the bit mapped map image to select a map image corresponding to a desired geographic area;
  - moving boundaries of the selected map image to shape the geographic area into a tessellated shape;
  - 10 sizing the selected map image to contain a predetermined pixel area;
  - and
  - storing the selected map image with an identifier of a reference point and size of the geographic area represented by the selected map image.
2. The method of claim 1 including repeating the steps to create a
- 15 plurality of digital map images from the printed map, each image having a uniform format of the predetermined pixel area and an identifier of a reference point and size of a geographic area.
3. The method of claim 1 wherein the identifier is a name of a computer-readable file containing the map image.
- 20 4. The method of claim 1 wherein the storing step comprises storing the selected map image on a CD-ROM.
5. The method of claim 1 wherein the desired geographic area is defined by reference grid lines, and the selected map image is cropped to the defining grid lines.
- 25 6. The method of claim 1 wherein the reference grid lines are longitude and latitude lines.
7. The method of claim 1 wherein the size of the geographic area is one degree by one degree.
8. The method of claim 1 wherein the selected map image
- 30 encompasses the desired geographic area, the method including further cropping the selected map image, if necessary, to match the image area to the tessellated geographic area.

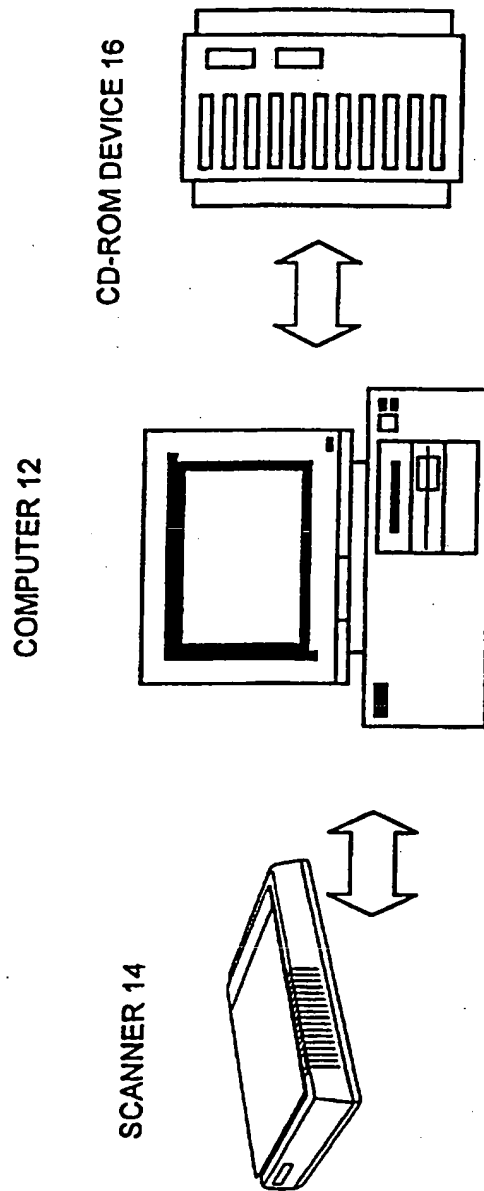
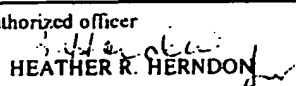


FIG. 1

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US96/10708

<b>A. CLASSIFICATION OF SUBJECT MATTER</b> IPC(6) :G06F 3/14; G09G 1/06 US CL :395/135, 128; 345/131 According to International Patent Classification (IPC) or to both national classification and IPC				
<b>B. FIELDS SEARCHED</b> Minimum documentation searched (classification system followed by classification symbols) U.S. : 395/100, 123, 128, 129, 134, 135; 345/131; 364/443 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)				
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>				
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.		
X	US, A, 5,283,562 (KANEKO ET AL) 01 February 1994, col.3, line 1 through col.4, line 65.	1-18		
A	US, A, 5,172,102 (IWAMURA ET AL) 15 December 1992.	NONE		
A	US, A, 5,390,292 (TAKAMURA ET AL) 14 February 1995.	NONE		
Y	US, A, 5,341,463 (WESCOTT ET AL) 23 August 1994, Figures 1, 30-35; col.1, lines 10-22; and col.8, line 7 through col.14, line 16.	1-18		
Y	Adobe System Incorporated, Adobe Photoshop - User Guide, 1993, pages 79-90, especially page 86.	1-18		
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.				
<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;">                     * Special categories of cited documents:                      *A* document defining the general state of the art which is not considered to be part of particular relevance                      *E* earlier document published on or after the international filing date                      *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)                      *O* document referring to an oral disclosure, use, exhibition or other means                      *P* document published prior to the international filing date but later than the priority date claimed                 </td> <td style="width: 50%; border: none;">                     *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention                      *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone                      *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art                      *&amp;* document member of the same patent family                 </td> </tr> </table>			* Special categories of cited documents: *A* document defining the general state of the art which is not considered to be part of particular relevance *E* earlier document published on or after the international filing date *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) *O* document referring to an oral disclosure, use, exhibition or other means *P* document published prior to the international filing date but later than the priority date claimed	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art *&* document member of the same patent family
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Date of the actual completion of the international search	Date of mailing of the international search report			
21 AUGUST 1996	17 SEP 1996			
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231	Authorized officer  HEATHER R. HERNDON			
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